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1. Introduction

a. This proposal describes scanning and locking superheterodyne receiving equipment covering the frequency range of 50 mc to 300 mc. Table 1 summarizes the expected performance characteristics. It is proposed that this equipment replace the existing Band 1 receiving equipment now used with System 4. The packaging of the proposed receiver will be contained within the volume and weight requirements of the existing Band 1 equipment. Self-contained power supply modules will permit this equipment to operate from various primary power sources. Minor changes in the wiring and logic of System 4 and the associated ground data-reduction equipment will be necessary to properly accommodate the new receiving system.

b. In addition to the obvious advantage of considerably extended frequency coverage within the same space and weight of the now-existing Band 1 receiving equipment, the proposed equipment possesses the following advantages:

- (1) It employs only electronic scanning, permitting a much wider choice of scan rates when desired.
- (2) Its frequency stability is primarily determined by crystal-controlled oscillators and is one to two orders of magnitude better than that of existing Band 1 equipment.
- (3) It is designed and packaged on a module basis, with strong emphasis on common design and mechanical/electrical interchangeability, thus permitting a wide flexibility of arrangement in frequency-range coverage and simplifying the maintenance and spare parts problems.
- (4) It possesses in addition to the detection modes now existing in Band 1, an extended capability of cw reception and provides for synchronous demodulation of phase-coherent signals.

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(5) It requires less power than existing Band 1 equipment because transistors are used in most of the circuitry.

Table 1

Summary of Exhibited Performance of Proposed Superheterodyne Receiver

Frequency Range	50-to-300 mc (with overlap) Sub-bands: 50-to-90 mc 90-to-160 mc 160-to-300 mc
Frequency Resolution	500 kc (coarse) 10 kc (fine)
Absolute Frequency Stability	Within \pm 250 kc
Selectivity	Coarse: 3-db bandwidth of 500 kc 60-db bandwidth of 1.65 mc Fine: 3-db bandwidth of 10 kc 60-db bandwidth of 35 kc
Noise Figure	Not to exceed 7 db under 90 mc Not to exceed 10 db under 300 mc
Dynamic Range	Not less than 70 db (threshold to saturation)
Spurious Response Rejection	Not less than 70 db (with respect to threshold)
AGC Characteristics	Delayed bias type; effective only when thresholds are exceeded. Effective for both pulse and cw
Video Response	50 cps to 250 kc
Audio Response	50 cps to 10 kc
Video Output Impedance	90 ohms
Audio Output Impedance	500 ohms
RF Input Impedance	50 ohms; VSWR not to exceed 2:1
Scanning Characteristics	Electrical; discrete frequency stepping
Detection	Pulse, AM, FM, pm, and cw
Expected Lock-On Sensitivity	-97 dbm (pulse) -110 dbm (cw)
Lock-On Times	0 to 3 minutes

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